

Serial No. 10/509,509

Docket No. MC1-7307

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AMENDMENTS TO THE DRAWINGS

Please replace FIG. 4 of the Drawings with the attached amended FIG. 4. In the amended FIG. 4, reference number "5" was added to refer to the incoming signal, per the Examiner's request.

Please replace FIG. 15 of the Drawings with the attached amended FIG. 15. In the amended FIG. 15, reference number "89" was added to refer to the collection path, per the Examiner's instructions. In addition, reference number "86" now refers only to the rotating plane mirror, and reference number "88" was moved to now refer to the quarter wave plate.

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REMARKS

Claims 1-18 are currently pending in the subject application, and are presently under consideration. Claims 1-18 are rejected. Claims 1, 4, 7, 8, and 12-14 have been amended. New claims 19-21 have been added. Favorable reconsideration of the application is requested in view of the amendments and comments herein.

I. Objection to Drawings

The drawings, specifically FIGS. 1, 4, and 15, have been objected to for failure to comply with 37 CFR 1.84(p)(4). FIGS. 4 and 15 have been amended, as described above in the Amendments to the Drawings section on page 2. FIG. 4 has been amended to include reference number "5" to indicate the incoming signal. FIG. 15 has been amended to include reference number "89" to indicate the collection path, and reference number "88" now refers to the quarter wave plate, as opposed to reference number "86". Withdrawal of the objection to FIGS. 4 and 15 is respectfully requested.

With regard to reference character "25", as it appears on page 13, line 6, not being displayed on any of the figures, the specification has been amended, as described above in the Amendments to the Specification section on page 3, to change reference character "25" to reference character "60", as shown on FIG. 2. Withdrawal of this objection is respectfully requested.

With regard to reference character "III" in FIG. 1 being unclear as to the scanning direction, Representative for Applicant respectfully disagrees. The cited section of the specification recites

In the apparatus of Figures 1 and 2, scanning of a target area of a patient's body is effected by rotating the mirror 14. This provides a single line scan. To collect data over a wider area, the housing 8 is mounted on a support (not shown) that facilitates controlled indexing movement of the housing 8 along a direction perpendicular to the scanning direction, indicated by line III of Figure 1. (Present Application, page 10, 25-32).

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Therefore, reference character III is not referring to a scan direction, as indicated in the Office Action dated January 29, 2007 (hereinafter "Office Action"), but is referring to an indexing movement direction that is perpendicular to the single line scans, such as at 10 and 12. The arrow next to the reference character III clearly indicates this perpendicular direction. For these reasons, withdrawal of the objection to FIG. 1 is respectfully requested.

II. Rejection of Claim 13 Under 35 U.S.C. §112, Second Paragraph

Claim 13 stands rejected under 35 U.S.C. §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which is regarded as the invention. Claim 13 has been amended to delete the exemplary element. Withdrawal of the rejection of claim 13 under 35 U.S.C. §112 is respectfully requested.

III. Rejection of Claims 1-3, 8, 17, and 18 Under 35 U.S.C. §103(a)

Claims 1-3, 8, 17, and 18 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,407,292 to Edrich ("Edrich") in view of U.S. Patent No. 5,760,397 to Huguenin ("Huguenin"). Withdrawal of this rejection is respectfully requested for at least the following reasons.

Claim 1 recites a collector for collecting radiation emitted from a patient and directing that radiation along a collection path to the detector in such a manner that the collected radiation has a defined sensitivity profile across and along substantially the entire length of the collection path. In the Office Action, the Examiner asserts that Edrich teaches this element of claim 1 based on the waveguide and receiving horn disclosed in Edrich (Office Action, page 7; citing Edrich, Abstract and col. 2, ll. 49-55). Representative for Applicant respectfully disagrees.

Edrich describes an imager that has a feedhorn and reflector in a near-field focusing arrangement to focus thermal radiation to a spot that indicates depth of temperature measurement based on a separation of the visible light beams (Edrich, col. 2, ll. 48-55 and 58-61; col. 3, ll. 60-64). The reflector height is automatically adjusted based on the desired depth of temperature measurement, and scanning is performed in a raster fashion along a line and orthogonal to that

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line (Edrich, col. 2, line 62 through col. 3, line 4). Therefore, Edrich teaches a static sensitivity profile along the scanned collection path of the beam. Specifically, the teachings of Edrich are directed to a system that scans the thermal radiation at a known focal point that corresponds to the desired depth of thermal measurement. In a near-field focusing arrangement, such as taught by Edrich, beam shape varies strongly with propagation distance, causing irregularity/asymmetry in the beam pattern at distances away from the focal plane. The system of Edrich overcomes this by automatically adjusting the height of the reflector to maintain the desired depth of thermal measurement. Therefore, Edrich does not teach or suggest that the collected radiation has a defined sensitivity profile across and along substantially the entire length of the collection path, as recited in claim 1.

The Present Application provides further insight as to the distinction between the language of claim 1 and the teachings of Edrich. Specifically, the Present Application describes that Edrich has poor spatial resolution, as well as long image acquisition time due to the relative insensitivity of the receiver (Present Application, page 2, ll. 1-5). The Present Application also states that, because the sensitivity profile of the collected radiation is defined along the entire length of the collection path, the knowledge of the beam incident on the reflector is improved based on the radiation being propagated in a well-controlled and definable pattern (Present Application, page 2, ll. 19-25). As a result, the Examiner's assertion that Edrich teaches that the collected radiation has a defined sensitivity profile across and along substantially the entire length of the collection path, as recited in claim 1, is internally inconsistent. In other words, there is no need for a sensitivity profile to be known along the collection path, as indicated in the language of claim 1, in a system where the height of the reflector is adjusted such that the beam has a constant sensitivity, as taught by Edrich. Therefore, Edrich does not teach or suggest that the collected radiation has a defined sensitivity profile across and along substantially the entire length of the collection path, as recited in claim 1.

Claim 1 also recites a quasi-optical isolator in the path of the collected radiation for preventing signal leakage from the detector being emitted towards the patient's body. The Examiner relies on Huguenin to teach this element of claim 1 (Office Action, pages 7-8; citing

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Huguenin, reference number 184). Representative for Applicant respectfully submits that Huguenin does not teach or suggest a quasi-optical isolator in the path of the collected radiation for preventing signal leakage from the detector being emitted towards the patient's body, as recited in claim 1.

Huguenin teaches a camera that receives signals at 94GHz (i.e., the RF frequency) and uses an array of heterodyne receivers based around subharmonic mixers which are pumped at a local oscillator (LO) frequency of 47GHz that is half that of the incoming radiation (see e.g., Huguenin, col. 6, ll. 37-49). The isolator 184 cited in the rejection of claim 1 is at 47GHz, and is mounted in the waveguide between the 47GHz sources (178,180) and the feedhorn (170) from which the 47GHz is beamed towards the detector array (Huguenin, FIG. 11; col. 6, line 66 through col. 7, line 2). Thus, the isolator 184 taught by Huguenin is simply present to prevent any back reflections from the feedhorn and optics affecting the 47GHz sources, which might otherwise become unstable. In the system taught by Huguenin, there may still be 94GHz leaking out of the front of the receiver array towards the captured scene. Accordingly, Huguenin does not teach or suggest a quasi-optical isolator in the path of the collected radiation for preventing signal leakage from the detector being emitted towards the patient's body, as recited in claim 1.

For the above described reasons, neither Edrich nor Huguenin, individually or in combination, teach or suggest claim 1. Withdrawal of the rejection of claim 1, as well as claims 2-18 which depend therefrom, is respectfully requested.

III. Rejection of Claims 4 and 5 Under 35 U.S.C. §103(a)

Claims 4 and 5 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Edrich in view of Huguenin, further in view of U.S. Patent No. 5,785,426 to Woskov, et al. ("Woskov"). Claims 4 and 5 depend from claim 1, and should therefore be allowed over the cited art for at least the reasons described above regarding claim 1. In addition, the Examiner relies on Woskov to teach or suggest the elements of claims 4 and 5 (Office Action, page 8; citing Woskov, col. 3, ll. 8-10; col. 6, ll. 7-24 and 28-35). Woskov teaches a pyrometer that includes a heterodyne millimeter/sub-millimeter-wave receiver adapted to receive radiation from a surface whose

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temperature is to be measured (Woskov, Abstract). However, Woskov does not cure the deficiencies of Edrich and Huguenin to teach or suggest claim 1, from which claims 4 and 5 depend. Therefore, Edrich, Huguenin, and Woskov, individually or in combination, do not teach or suggest claims 4 and 5. Withdrawal of the rejection of claims 4 and 5 is respectfully requested.

IV. Rejection of Claim 6 Under 35 U.S.C. §103(a)

Claim 6 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Edrich in view of Huguenin, further in view of U.S. Patent No. 4,852,973 to Durnin, et al. (Durnin"). Withdrawal of this rejection is respectfully requested for at least the following reasons.

Claim 6 depends from claim 1, and should therefore be allowed over the cited art for at least the reasons described above regarding claim 1. In addition, claim 6 recites that the collector is such that the collected radiation has a Bessel sensitivity profile. The Examiner relies on Durnin to teach the elements of claim 6 by stating that Durnin teaches collecting radiation that has a Bessel sensitivity profile (Office Action, page 9; citing Durnin, Abstract). Representative for Applicant respectfully disagrees. Durnin teaches generating a well defined traveling wave beam substantially unaffected by diffractive spreading (Durnin, Abstract). The beam is generated having a transverse dependence of a Bessel function (Id.). Therefore, Durnin does not teach *collecting* radiation that has a Bessel sensitivity profile, as recited in claim 6, but instead teaches *generating* a beam that has a transverse Bessel function dependence. Therefore, Durnin does not teach or suggest that the collector is such that the collected radiation has a Bessel sensitivity profile, as recited in claim 6. Accordingly, Edrich, Huguenin, and Durnin, individually or in combination, do not teach or suggest claim 6. Withdrawal of the rejection of claim 6 is respectfully requested.

V. Rejection of Claim 7 Under 35 U.S.C. §103(a)

Claim 7 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Edrich in view of Huguenin further in view of Durnin and further in view of U.S. Patent No. 4,545,653 to

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Brenden, et al. ("Brenden"). Withdrawal of this rejection is respectfully requested for at least the following reasons.

Claim 7 depends from claim 1, and should therefore be allowed over the cited art for at least the reasons described above regarding claim 1. In addition, claim 7 has been amended to recite an axicon in the path of the collected radiation and configured to convert the Bessel sensitivity profile of the collected radiation to a Gaussian sensitivity profile. Brenden teaches an axicon-type focusing element implemented in an optical playback system. However, Representative for Applicant respectfully submits that neither Brenden nor any of the other cited references teach or suggest an axicon in the path of the collected radiation and configured to convert the Bessel sensitivity profile of the collected radiation to a Gaussian sensitivity profile, as recited in amended claim 7. Withdrawal of the rejection of claim 7 is respectfully requested.

VI. Rejection of Claims 9-12 Under 35 U.S.C. §103(a)

Claims 9-12 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Edrich in view of Huguenin further in view of U.S. Patent No. 6,469,820 to Mushiake, et al. ("Mushiake"). Withdrawal of this rejection is respectfully requested for at least the following reasons.

Claims 9-11 depend from claim 1, and should therefore be allowed over the cited art for at least the reasons described above regarding claim 1. In addition, the Examiner relies on Mushiake to teach or suggest the elements of claims 9 and 10 (Office Action, page 10; citing Mushiake, col. 5, ll. 24-28; col. 10, ll. 36-40). Mushiake teaches an optical scanner used to reform an original image on a CCD line sensor (Mushiake, Abstract). However, Mushiake does not cure the deficiencies of Edrich and Huguenin to teach or suggest claim 1, from which claims 9-11 depend. Therefore, Edrich, Huguenin, and Mushiake, individually or in combination, do not teach or suggest claims 9-11. Withdrawal of the rejection of claims 9-11 is respectfully requested.

Claim 12 depends from claim 11, and should therefore be allowed over the cited art for at least the reasons described above regarding claim 11. In addition, claim 12 has been amended to

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recites that the indexing means is operable to swing the deflector about a second axis perpendicular to the first axis. The Examiner asserts that Mushiake teaches means for swinging the deflector about a second axis perpendicular to the first axis (Office Action, page 10; citing Mushiake, col. 5, ll. 16-19). Representative for Applicant respectfully disagrees.

Mushiake teaches scanning by rotating a mirror in a conventional mirror-scan manner (Mushiake, col. 5, ll. 16-18). Mushiake also teaches that there is an amount of space that enables 360 degrees of rotation between an object side lens unit and an image side lens unit, and that the mirror, alone, does not rotate, but the object side lens unit rotates about the same axis to retain an optical path through the lens units via the mirror (Mushiake, col. 5, ll. 19-24; col. 4, ll. 20-27). The rotation of the mirror, as disclosed by Mushiake, is only on a single axis in angular increments of an angle θ (Mushiake, FIG. 1). Therefore, Mushiake does not teach or suggest indexing means that is operable to swing the deflector about a second axis perpendicular to the first axis, as recited in claim 12. Accordingly, Edrich, Huguenin, and Mushiake, individually or in combination, do not teach or suggest claim 12. Withdrawal of the rejection of claim 12 is respectfully requested.

VII. Rejection of Claim 13 Under 35 U.S.C. §103(a)

Claim 13 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Edrich in view of Huguenin. Withdrawal of this rejection is respectfully requested for at least the following reasons.

Claim 13 has been amended to recite that the imager is operable to form an image from emitted radiation in the frequency range of 90-100GHz. The Examiner rejects claim 13 reciting the frequency range of 10-200 GHz based on overlapping ranges of 8-36 GHz, as taught by Edrich, and 30-300 GHz, as taught by Huguenin. The amendment to claim 13 thus obviates the frequency range taught by Edrich. However, Representative for Applicant respectfully submits that the disclosed range of 30-300 GHz taught by Huguenin is insufficient to render obvious the frequency range of 90-100 GHz, as recited in claim 13.

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The Federal Circuit has decided that, if the reference's disclosed range is so broad as to encompass a very large number of possible distinct compositions, this might present a situation analogous to the obviousness of a species when the prior art broadly discloses a genus. *In re Harris*, 409 F.3d 1339, 74 USPQ2d 1951 (Fed. Cir. 2005). See also *In re Baird*, 16 F.3d 380, 29 USPQ2d 1550 (Fed. Cir. 1994); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992); MPEP § 2144.08. The frequency range recited in claim 13 (*i.e.*, spanning 10 GHz) is significantly narrower than the range disclosed in Huguenin (*i.e.*, spanning 270 GHz), and should thus be considered a species of the broad genus disclosed in Huguenin. In addition, the Present Application is directed to subcutaneous imaging, and states that "the 90-100 GHz band gives a reasonable compromise between penetration depth and spatial resolution," (Present Application, page 12, ll. 26-28). In contrast, the system of Huguenin is directed to detection of non-metallic weapons and explosives concealed under clothing (Huguenin, col. 1, ll. 9-16). Therefore, the frequency range recited in claim 13 is critical to the use described in the Present Application to achieve the intended results. The Federal Circuit has decided that criticality of a range can be used to rebut a *prima facie* case of obviousness based on an overlapping range. See, *e.g.*, *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). As a result, the frequency range disclosed in Huguenin does not render claim 13 obvious. Accordingly, neither Edrich nor Huguenin, individually or in combination, teach or suggest claim 13. Withdrawal of the rejection of claim 13 is respectfully requested.

VIII. Rejection of Claims 14-16 Under 35 U.S.C. §103(a)

Claims 14-16 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Edrich in view of Huguenin further in view of Woskov. Withdrawal of this rejection is respectfully requested for at least the following reasons.

Claims 14-16 depend from claim 1, and should therefore be allowed over the cited art for at least the reasons described above regarding claim 1. In addition, the Examiner relies on Woskov to teach or suggest the elements of claims 14-16 (Office Action, pages 11-12; citing Woskov, col. 11, line 49 through col. 12, line 28). However, Woskov does not cure the

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deficiencies of Edrich and Huguenin to teach or suggest claim 1, from which claims 14-16 depend. Therefore, Edrich, Huguenin, and Mushiake, individually or in combination, do not teach or suggest claims 14-16. Withdrawal of the rejection of claims 14-16 is respectfully requested.

IX. New Claims 19-21

New claim 19 depends from claim 1 and recites that the scanning means scans the target area of the patient such that the collection path is in the form of a circumference of a notional cylinder at each of a plurality of indexed steps. Representative for Applicant respectfully submits that none of the cited references, individually or in combination, teach or suggest new claim 19. Consideration and allowance of new claim 19 is respectfully requested.

New claim 20 depends from claim 1 and recites that a given spot on the collection path resides on a focal plane of the scanning means, such that the sensitivity profile is symmetrical and reduced about the given spot along the collection path. Representative for Applicant respectfully submits that none of the cited references, individually or in combination, teach or suggest new claim 20. Consideration and allowance of new claim 20 is respectfully requested.

New claim 21 depends from claim 1 and recites that the defined sensitivity profile of the collection path is non-uniform across and along the collection path based on known changes in a location of a focal spot of the scanning means along the collection path. Representative for Applicant respectfully submits that none of the cited references, individually or in combination, teach or suggest new claim 21. Consideration and allowance of new claim 21 is respectfully requested.

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CONCLUSION

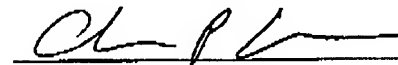
In view of the foregoing remarks, Applicant respectfully submits that the present application is in condition for allowance. Applicant respectfully requests reconsideration of this application and that the application be passed to issue.

Please charge any deficiency or credit any overpayment in the fees for this amendment to our Deposit Account No. 20-0090.

Respectfully submitted,

Date

5/29/07



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